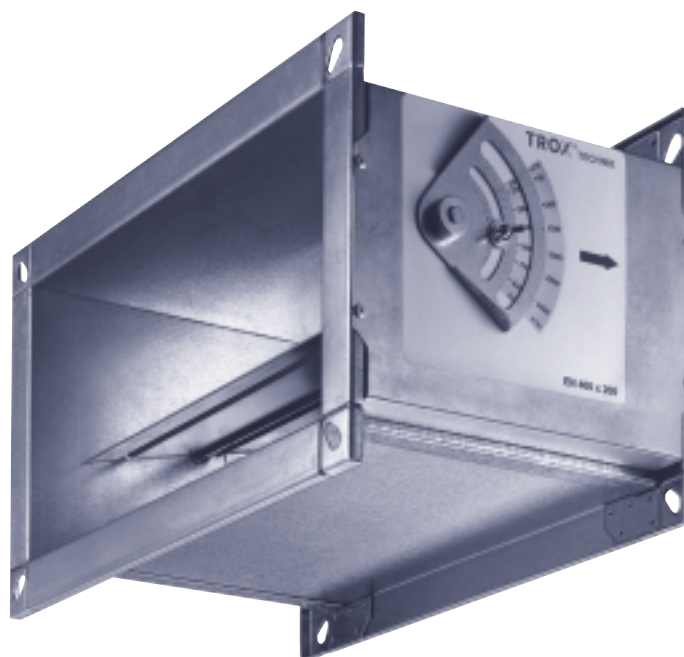


Volume Flow Rate Controller

for constant volume systems

Type E



TROX® **TECHNIK**

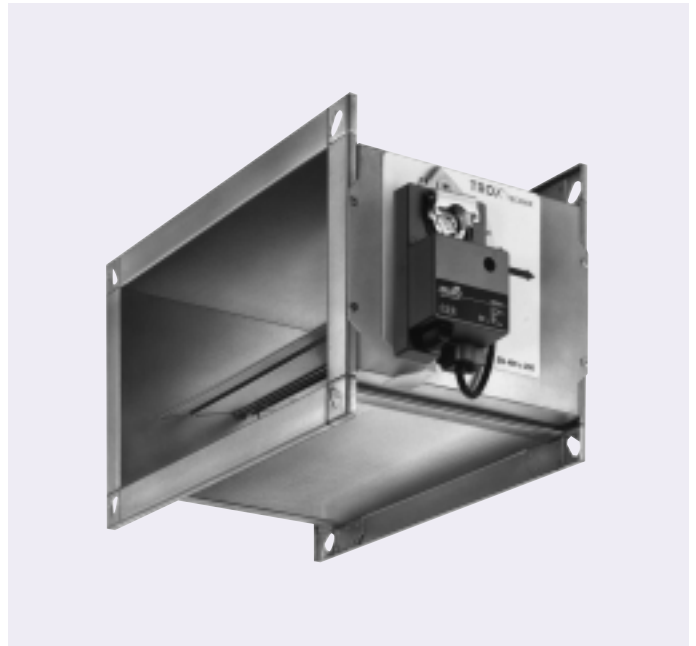
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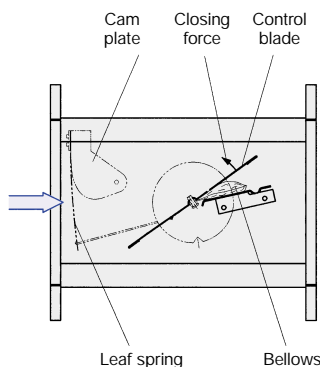
Volume Flow Rate Controller Type EN



Volume Flow Rate Controller Type EN with Actuator



Trox type E volume flow rate controllers are mechanical system powered controllers for constant volume systems. The volume flow rate controller operates without an external power supply. A control blade supported in bearings is positioned by aerodynamic forces such that a pre-set volume flow is maintained constant over the entire differential pressure range.



The aerodynamic closing force on the control blade is amplified by the inflating bellows which also acts as an oscillation damper. A suitably calibrated leaf spring acts against the closing force (see diagram). The leaf spring is adjusted via a cam disc such that as the pressure differential Δp_g changes, the angle of the control blade is adjusted to provide a constant flow rate within a close tolerance.

The volume flow can be accurately set using an external scale with indicator. To simplify on site installation, controllers need only be installed on a size basis and the actual volume flow easily and accurately set up during commissioning.

Construction · Dimensions

Design Features

Casing

- Rectangular construction
- Flanged on both ends

- Volume flow rate controlled with low tolerance
- Volume flow rate adjustment via external scale, scale accuracy approx. $\pm 4\%$
- The control blade mechanism is maintenance-free

Volume Flow Rate Controller

- Mechanical system powered, no external power supply
- For supply air or extract air
- Operating temperature 10 to 50 °C
- Differential pressure range of 50 to 1000 Pa
- Can be installed in any orientation with horizontal blade shaft
- Correct functioning even with unfavourable inlet and outlet flow conditions (required straight inlet length 1.5 B and outlet length 0.5 B)
- Control blade shaft supported in bearings
- Control bellows also acts as an oscillation damper
- Volume flow range 4:1

Actuators

- For setpoint changeover via remote signals
- Electrical supply 24 VAC or 230 VAC
- Factory-fitted
- Compact construction takes up little space

Materials

- Casing and control blade in galvanised sheet steel
- Stainless steel leaf spring
- Polyurethane bellows
- Bearings with PTFE lining

EN

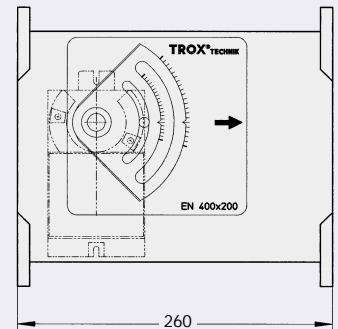
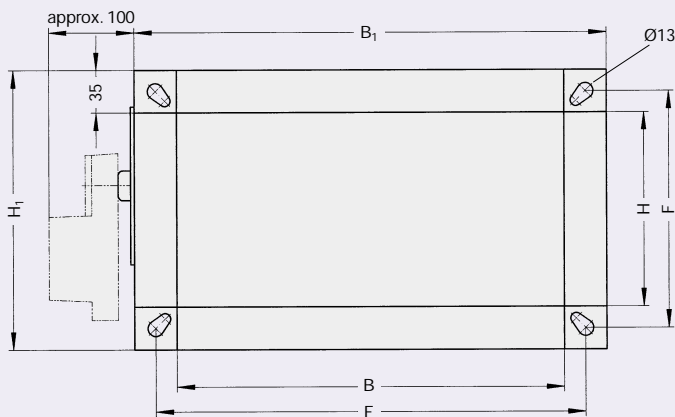


Table 1: Volume flow ranges, dimensions in mm and weight in kg

B x H	Δp_g min in Pa	V			Casing				Weight
		in l/s	in m ³ /h	ΔV $\pm\%$	B ₁	H ₁	E	F	
320x160	50	110	396	10	390	230	355	195	5.5
	50	220	792	7					
	50	330	1188	5					
	50	440	1584	5					
400x200	50	210	756	13	470	270	435	235	7.0
	50	420	1512	9					
	50	630	2268	6					
	50	840	3024	5					
500x250	50	300	1080	10	570	320	535	285	8.0
	50	600	2160	7					
	50	900	3240	5					
	50	1200	4320	5					
400x300	50	315	1134	13	470	370	435	335	8.0
	50	630	2268	9					
	50	945	3402	6					
	50	1260	4536	5					
500x300	50	375	1350	13	570	370	535	335	9.0
	50	750	2700	9					
	50	1125	4050	6					
	50	1500	5400	5					
600x300	50	420	1512	13	670	370	635	335	10.0
	50	820	2952	9					
	50	1240	4464	6					
	50	1680	6048	5					

Nomenclature · Air-Regenerated Noise

Nomenclature

f_m in Hz: Octave centre frequency	Δp_g in Pa: Total pressure differential
L_w in dB: Sound power level (re 1 pW) of air-regenerated noise in connection duct	$\Delta p_{g \min}$ in Pa: Minimum operating pressure differential
L_{w1} in dB: Sound power level (re 1 pW) of radiated noise with 3 m air duct on inflow and discharge sides (All noise levels measured in reverberant room. Sound power levels determined and corrected in accordance with ISO 5135, December 1997)	\dot{V} in l/s or m ³ /h: Volume flow
L in dB(A): A-weighted sound power level (re 20 μ Pa) of air-regenerated noise assuming reflection attenuation and room attenuation of 8 dB/Oct.	$\Delta \dot{V}$ in \pm %: Volume flow tolerance based on set volume value. Increased tolerance must be taken into account in the case of direct connection behind obstructions/bends in ductwork
L_1 in dB(A): A-weighted sound power level (re 20 μ Pa) of case-radiated noise, assuming room attenuation of 8 dB/Oct.	NC : Noise criteria value of L_w assuming 8 dB/Oct. reflection attenuation room attenuation
	NC ₁ : Noise criteria value of L_w assuming 8 dB/Oct. room attenuation

Table 2: Air-regenerated noise

B x H	\dot{V}		$\Delta p_g = 100$ Pa										$\Delta p_g = 250$ Pa										$\Delta p_g = 500$ Pa										$\Delta p_g = 1000$ Pa									
			L_w in dB										L_w in dB										L_w in dB										L_w in dB									
			f_m in Hz										f_m in Hz										f_m in Hz										f_m in Hz									
			63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L in dB(A)	NC
320x160	110	396	49	45	42	41	46	46	40	34	43	38	52	49	46	44	53	56	51	47	52	48	58	52	48	50	57	61	59	54	58	54	63	56	51	52	59	64	64	64	62	58
	220	792	61	53	48	45	49	48	43	38	45	41	65	59	54	51	56	58	54	50	54	51	67	61	58	56	60	64	62	58	61	57	69	64	59	58	64	69	69	67	66	63
	330	1188	67	56	51	49	52	51	46	40	48	43	71	63	57	55	58	60	55	51	56	52	74	68	63	60	63	67	63	60	63	59	77	70	66	64	67	71	70	68	68	64
	440	1584	69	60	54	51	54	53	49	43	50	45	77	68	61	58	60	62	58	53	59	55	79	73	66	63	64	69	65	62	65	61	81	75	71	68	69	73	72	69	70	66
400x200	210	756	57	51	46	45	48	48	39	30	45	40	61	59	58	52	55	58	52	44	54	51	64	61	59	55	59	64	59	52	59	56	65	62	61	57	61	66	65	63	63	59
	420	1512	64	56	52	52	52	53	47	39	50	46	70	63	59	57	58	62	56	50	58	54	72	68	65	62	63	68	64	58	64	61	77	70	68	68	68	71	71	66	69	64
	630	2268	72	64	58	58	57	59	54	47	55	52	76	69	63	62	62	65	61	55	61	58	78	75	68	65	65	70	67	61	66	63	81	77	72	70	70	75	73	68	72	67
	840	3024	78	69	63	62	60	63	59	52	60	56	81	74	67	66	64	69	64	58	65	61	83	79	71	69	68	73	69	64	69	65	85	80	75	72	72	77	75	71	74	69
500x250	300	1080	55	48	43	47	47	41	36	44	40	60	55	50	51	55	58	54	49	54	51	65	57	53	56	58	63	62	58	60	56	69	58	54	59	62	67	69	68	66	63	
	600	2160	65	54	49	52	51	51	46	40	48	44	71	62	57	57	58	61	56	52	57	53	72	68	62	62	62	66	64	61	63	59	77	70	66	67	67	71	72	70	69	66
	900	3240	70	61	55	57	55	57	53	46	54	50	77	67	61	61	61	64	60	56	60	56	80	73	67	66	65	69	67	63	66	61	83	77	72	71	70	74	74	72	72	68
	1200	4320	73	65	59	60	57	59	55	48	56	52	81	71	65	65	63	66	63	58	63	58	83	77	70	68	68	71	69	65	68	63	86	82	76	74	73	76	76	73	74	70
400x300	315	1134	50	46	41	44	45	46	41	33	42	38	54	53	48	50	53	55	52	46	52	48	59	59	53	58	59	63	61	56	59	55	64	62	56	63	65	67	67	66	65	61
	630	2268	58	52	47	48	49	49	47	39	46	42	64	62	53	53	55	57	56	49	54	50	69	68	62	62	62	66	65	60	63	59	79	77	69	68	69	71	72	68	69	66
	945	3402	61	56	51	53	53	54	52	47	52	47	70	65	57	56	58	60	59	53	57	53	75	72	63	62	62	66	65	60	63	59	79	77	69	68	69	71	72	68	69	66
	1260	4536	64	59	54	54	55	56	54	48	53	48	73	68	59	59	60	62	62	57	60	55	78	76	65	64	64	67	67	62	65	61	82	81	72	70	70	73	74	69	71	67
500x300	375	1350	50	43	40	45	47	46	40	33	43	39	61	53	48	51	55	56	52	47	53	49	64	57	52	57	60	63	61	57	60	56	69	63	58	63	65	68	68	67	66	62
	750	2700	60	50	46	48	49	49	44	36	46	41	69	59	52	54	57	58	54	49	55	51	74	65	58	60	62	65	63	58	61	57	75	71	64	66	68	70	70	68	68	64
	1125	4050	65	55	51	53	53	54	49	42	51	46	76	63	56	57	59	60	57	51	57	53	77	70	62	62	64	67	65	60	63	59	80	76	68	68	70	72	72	69	70	66
	1500	5400	67	59	54	55	56	57	52	45	53	49	80	66	59	59	61	63	60	54	60	56	82	74	64	64	66	68	66	62	65	61	83	80	71	69	72	74	73	69	71	67
600x300	420	1512	53	44	40	44	47	46	40	34	43	38	62	53	48	50	55	56	52	48	53	49	65	58	54	56	60	63	61	57	60	55	70	63	58	61	66	68	68	67	66	62
	820	2952	61	53	47	48	52	50	46	40	48	43	68	59	53	53	57	58	55	50	55	50	72	66	59	60	62	65	63	59	62	57	78	72	67	66	68	70	70	69	68	64
	1240	4464	64	56	51	52	54	53	49	43	51	46	73	64	56	56	60	60	57	52	57	53	78	71	63	61	64	67	65	61	64	59	82	77	71	68	70	72	72	69	70	66
	1680	6048	68	60	55	55	57	57	53	46	54	49	77	67	60	59	62	63	60	56	60	56	83	76	66	64	66	68	67	63	65	61	86	82	74	71	72	74	74	71	72	67

Case-Radiated Noise

Example

Given: Size 400 x 200
 $\dot{V} = 630$ l/s approx. 2268 m³/h
 $\Delta p_g = 250$ Pa
 Specified sound pressure level in room 50 dB(A)
 with 4 dB/Oct. room attenuation and
 4 dB/Oct. ceiling transmission loss

Required: Sound pressure level in case-radiated noise
 in room at 630 l/s or 2268 m³/h

Calculation

f_m	63	125	250	500	1000	2000	4000	8000
L_{w1}	63	65	56	52	52	50	42	38
Ceiling transmission loss ¹⁾	4	4	4	4	4	4	4	4
Room attenuation ¹⁾	4	4	4	4	4	4	4	4
A-weighting	55	57	48	44	44	42	34	30
Corrected level	29	41	39	41	44	43	35	29

¹⁾ see VDI 2081, for example

Result: L_1 approx. 49 dB(A) according to logarithmic addition. Specified requirement fulfilled.

Table 3: Case-radiated noise

B x H	\dot{V}		$\Delta p_g = 100$ Pa														$\Delta p_g = 250$ Pa														$\Delta p_g = 500$ Pa														$\Delta p_g = 1000$ Pa													
			L_{w1} in dB														L_{w1} in dB														L_{w1} in dB														L_{w1} in dB													
			f_m in Hz														f_m in Hz														f_m in Hz														f_m in Hz													
			L_1 in dB(A)														L_1 in dB(A)														L_1 in dB(A)														L_1 in dB(A)													
I/s	m ³ /h	63	125	250	500	1000	2000	4000	8000	NC	63	125	250	500	1000	2000	4000	8000	L ₁ in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L ₁ in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L ₁ in dB(A)	NC																		
320x160	110	396	41	38	34	32	35	34	30	23	32	27	42	43	39	39	43	44	41	37	41	36	45	47	42	42	47	49	47	45	46	41	51	52	47	46	50	53	54	54	52	49																
	220	792	47	45	38	35	38	37	33	27	35	29	53	54	48	42	45	46	45	42	44	39	57	57	52	47	49	52	51	50	50	45	58	60	56	52	54	57	57	56	55	51																
	330	1188	51	51	44	39	41	40	37	31	38	32	59	58	52	45	47	48	46	43	46	40	61	63	58	52	51	53	52	51	52	46	65	66	63	58	56	58	58	59	57	53																
	440	1584	54	53	46	41	43	41	37	31	40	34	63	63	55	48	49	49	47	45	48	42	66	69	63	55	53	55	53	52	54	47	70	71	69	63	58	59	59	59	60	54																
400x200	210	756	46	49	45	40	41	35	23	20	37	32	49	56	58	53	49	47	38	34	47	40	52	58	58	58	58	55	52	48	54	49	54	59	60	58	59	60	59	57	58	53																
	420	1512	48	51	45	43	41	36	26	21	37	31	57	62	54	51	50	50	41	36	48	42	60	65	62	59	56	57	51	47	55	49	64	69	67	70	65	62	64	61	64	59																
	630	2268	53	54	47	46	44	39	30	24	40	34	63	65	56	52	52	50	42	38	49	42	66	72	63	59	56	58	52	48	56	51	69	76	69	67	63	63	61	58	62	55																
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	600	2160	58	53	43	41	38	38	32	25	37	30	67	64	53	48	45	47	44	39	46	40	72	71	61	54	50	52	50	47	53	49	77	76	69	63	56	57	57	56	59	56																
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400x300	315	1134	43	40	35	35	36	34	30	23	32	26	47	49	44	42	43	44	43	39	42	37	52	54	51	49	50	51	52	50	46	56	59	56	55	57	57	58	58	56	53																	
	630	2268	50	48	41	40	40	38	34	27	37	30	57	57	50	45	45	45	40	44	39	63	65	58	52	50	51	52	50	46	68	72	66	59	57	57	58	58	58	53																		
	945	3402	55	52	46	45	44	42	39	31	41	34	65	61	53	49	49	48	46	42	47	40	70	70	62	55	53	53	52	54	48	75	78	71	62	58	58	59	59	61	58																	
	1260	4536	56	53	48	47	45	43	39	0	42	35	66	63	56	51	51	49	48	44	49	42	73	71	63	56	54	54	53	52	55	50	77	79	73	63	59	59	59	58	62	59																
500x300	375	1350	46	41	36	35	35	33	27	18	32	26	55	50	45	43	44	43	40	34	41	36	59	56	51	48	49	49	48	44	47	42	63	61	58	55	55	55	55	53	54	49																
	750	2700	53	48	42	40	39	35	29	19	36	29	62	58	51	46	46	44	41	34	44	37	67	65	59	52	52	51	49	45	50	43	72	71	66	59	57	56	56	54	57	50																
	1125	4050	58	52	45	44	42	38	32	20	39	32	66	61	53	48	48	45	41	35	46	38	72	69	62	55	53	52	49	45	52	47	77	76	70	62	59	57	57	54	59	55																
	1500	5400	61	55	48	47	44	42	35	22	42	35	70	66	57	51	51	48	43	39	49	42	76	73	65	56	55	53	50	48	55	51	80	79	73	64	60	58	57	54	62	60																
600x300	420	1512	52	43	37	34	34	31	26	17	31	25	61	53	48	41	42	42	39	37	41	34	63	59	54	48	48	49	48	47	48	42	69	67	65	56	54	55	56	56	56	51																
	820	2952	62	50	43	39	38	34	28	18	35	28	69	62	55	46	45	43	41	40	45	37	72	69	63	52	50	49	48	49	52	47	77	75	72	61	56	56	56	56	59	57																
	1240	4464	62	53	46	43	41	37	32	20	39	32	71	66	58	48	46	45	42	41	48	43	78	75	68	56	52	51	49	49	56	54	83	81	77	65	59	58	57	58	64	62																
	1680	6048	66	57	51	46	45	41	36	21	42	35	76	70	62	51	50	48	44	41	51	48	82	79	72	59	54	53	51	50	60	59	86	84	80	68	61	59	58	58	66	67																

Order Details

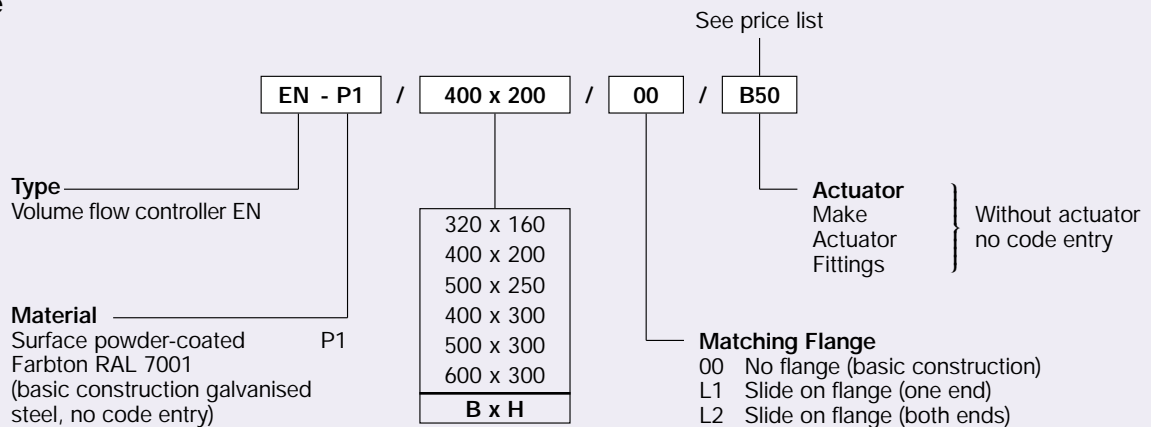
Specification Text

Rectangular volume flow rate controller for constant volume systems, mechanical system powered, external power supply not required. For supply or extract air, differential pressure range 50 - 1000 Pa. Control blade shaft supported in bearings, control bellows also provides oscillation damper action, volume range 4:1. Volume flow control, with low tolerance, external adjustment scale to set volume flow, maintenance free, independent of gravity (horizontal blade shaft).

Material:
Casing made of galvanised sheet steel, control blade supported in bearings with PTFE lining.
Polyurethane bellows.

Also with:
Actuator,
24 VAC or 230 VAC
for remote setpoint adjustment

Order Code



The controller is supplied with a preset reference volume flow. For units with actuators, the minimum and maximum required volume flow rates are set.

Order example

Make: TROX
Type: EN - P1 / 400 x 200 / 00 / B50